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BRIEFLY TOLD.

THE BRANHAM-HARDESTY IMPOSITION AT ST. LOUIS.—On our editorial page for August 12th will be found an account of a measure that had been introduced some time previously in the St. Louis House of Delegates by certain speculators, represented by other tools, the ostensible object of the scheme being to provide the city with a municipal gas plant that was to be paid for by the city when the speculators had thoroughly sucked the orange. Those who are curious to determine at this time the exact nature of the proposition, can satisfy themselves thereon by referring to the issue of the JOURNAL noted above, as a mere summary of the leading features of the same will answer our present purposes.

Sec. 1 relates that a contract is entered into by G. F. Branham, S. B. Johnson, Chas. Hardesty, as the St. Louis Gas works Company, with the city under which the contractors shall build gas works and subsequently turn them over to the city. Sec. 2 notes that the amount agreed upon as the value of the plant shall be $4,500,000. Upon this as a basis a rental of 5 per cent. per annum ($225,000) shall be paid by the city to the contractors or owners, the same to be paid in semi-annual installments. Sec. 3 provides that the city shall lease the plant for a term of 30 years at the rate per annum noted above, at the end of which time the city shall have the privilege of purchasing the plant by paying $4,500,000 for it, provided the decision to purchase is arrived at at least one year and not over two years previous to the expiration of the 30 years. Failing this, the plant is to become the sole property of the Works Company, with an added term of life of 50 years. Sec. 4 asserts that the city must make all repairs, improvements, betterments, etc., during the 30 years, and keep the establishment in pace with the growth of the city. These additions and betterments are to become a part of the works, and are to belong to the owners thereof. It is also provided that the city shall pay all insurance rates, and that no taxes shall be levied on the works or real estate. The 5th section is to the effect that the plant shall have a producing capacity of one billion cubic feet per annum, and that the rate that may be charged for gas shall not exceed $1 per 1000. The Company may at any time incumber the plant by mortgage up to $4,500,000, at an interest rate not to exceed 5 per cent. The Company is to have the free use of the streets and highways, etc. Sec. 6 defines when contractors work shall begin, and when it shall be completed. Sec. 7 fixes the bond of the contractors at $100,000. Sec. 8 divides the city into districts. Sec. 9 declares that the work of building, pipe laying, etc., shall be under the direction of an Inspector and the Board of Public Improvements. Sec. 10 regulates the manner of executing the legal forms of the contract. Sec. 11 declares that the accounts of the Company must be kept apart from any other municipal accounts, and at the end of each fiscal year the net revenue, after the payment of all rents and operating expenses, shall be made a sinking fund with which the city shall ultimately pay for the gas works, but in case the city does not buy the works the sinking fund is to be paid over to the Company, in addition to the 50-year franchise. Section 12 provides for the appointment of an Inspector who shall have supervision of the works. His salary ($3,000 per annum) is to be paid by the Company.

In brief, this is the substance of the measure that was indorsed last Summer by the St. Louis House of Delegates, and a bolder fraud, without one thing in it to reccommend it, was never before passed by any municipal body. In fact, so ridiculously absurd did the measure seem, that no one, either in St. Louis or outside of it, that had cognizance of the scheme—in fact, we think its proposers shared similar views—presumed that it would ever again be favorably heard from after its reception from the House of Delegates by the Councils branch of the government. When the bill came to the latter, its consideration was indefinitely postponed, and the unanimous opinion concerning its fate was that the pigeonhole into which it was slipped would prove to be its grave. On Friday, December 20, however, after some trifling business had been disposed of by the Council, Mr. Rohan moved that Bill No. 283 be taken from the table for consideration. President Walbridge asked what the title of the bill was, and the blissful ignorance of the Chairman on this point is proof conclusive of the adroit and quiet manner in which the conspirators had prepared themselves. Mr. Rohan remarked "That it was the gas bill." The Council Chamber was at once transformed from a humdrum meeting place to a house of babbling unrest. The friends of the measure, however, betrayed no uneasiness. The "noses" had evidently been counted, and the drill of their owners was little short of perfect. Every motion looking for delay was promptly voted down (13 members were present), and in the end numbers of "noses" and perfection of drill won the day. The solid and faithful seven overmastered the perturbed and disconnected six, and the majority clinched the matter by defeating a resolution for reconsideration. At the present stage, then, of the contest it rests with Mayor Noonan to say whether the future history of the "Branham-Hardesty" infamy shall be made in the courts or whether its life shall be throttled by his veto. While in any event it is not likely that the conspirators will ever be allowed to consummate their brazen project, for the "contract" is to our minds as clearly outside the pale of lawful forms as it is immeasurably beyond the lines of common sense and municipal morality, we sincerely hope that the Mayor will not permit the conspirators to have even the bare satisfaction of airing their effrontery before a tribunal charged with defining that which is just or unjust.

Annual Meeting, Society of Gas Lighting.—The annual meeting of the Society of Gas Lighting was held in New York on the 19th inst., and the number of responses to the roll-call was gratifyingly large. The records of the Society during the year add further testimony to its usefulness, and also prove that age but increases its vitality. The Treasurer's report caused general satisfaction, save in one respect. This was a strongly defined sentiment of sorrow that its presentation reminded the members that its figures this year were not those of Colonel Jas. H. Armington, whose continued ill-health rendered it incumbent on him, in justice to himself, to resign, at an earlier period in the year, the Treasurership, an office that he had occupied from the time of the formation of the Society.

The officers designated to manage the Society's affairs in 1890 are:

President—Joseph R. Thomas.
Vice-President—Eugene Vanderpool.
Treasurer—Wm. Combe.
Secretary—Fred. S. Benson.
Member of Executive Committee—F. C. Sherman.
Finance Committee—A. M. Smith, Alex. Strecker, C. H. Coggshall.

In the allotment for papers, the following result was reached:

January.—Messrs. Greenough, Hallett and Farmer.
February.—Messrs. Coggshall, Sherman and Turner.
March.—Messrs. Stedman, Mooney and Humphreys.
April.—Messrs. Lamson, Smith and McMillin.
May.—Messrs. Sabbaton, Bradley and Flemming.
June.—Messrs. Nettleton and Cushing.
September.—Messrs. Vanderpool, Taber and Crockett.
October.—Messrs. Strecker, Stiness and Slater.
November.—Messrs. Wood, Forstall and Hambleton.

Having disposed of the regular business, the Society sat down to the enjoyment of the annual banquet, the arrangements for which had been made by Messrs. Smith, Benson and Mooney. With such epicures for providers it can be readily understood that the dinner was as it should be. We might also note that the *menu* cards have been in great demand since the day of the feast, not perhaps so much for their elegance as for the oddities of the text. Toastmaster Benson was, as usual, a great success.

Books Received.—We are indebted to Mr. F. S. Cripps, Assoc. Mem. Inst. C. E., of Surrey, England, for a copy of his work on "The Guide-Framing of Gasholders," which volume also contains several other chapters dealing chiefly with strains in structures connected with gas works. Although the publication is largely, if not wholly, made up of articles on these subjects that had been at various times contributed by Mr. Cripps to the columns of the *Journal of Gas Lighting*, it is none the less valuable now as a ready work of reference. It is printed from good type on sound paper, and is illustrated profusely. It is, in short, a work that is of great value to the gas engineer, who will at once find enjoyment, satisfaction and profit from a perusal of its pages. It is needless to add that Mr. Cripps is an authority on the matters treated in this publication.

We are also in receipt of a copy of the fifth edition of "Newbigging's Handbook for Gas Engineers and Managers," which old friend comes to us in a shape that differs materially from the type of its predecessors. Naturally as an article takes on age it should also show evidence of change, and so it is with "Newbigging's." Instead of the pocket style of book it is now quite a volume, but in compensation for this alteration—and we think the gain is all in favor of the new design—much new matter has been incorporated; and the whole, including the tables, is printed from much larger type than that favored in the earlier editions. It is something after the hopeless task of attempting to add beauty to gold by gilding it to say that Newbigging's is valuable to the gas man, but as the gold of commerce differs in respect to the quantity or weight of alloy that accompanies each particular specimen, perhaps we may be forgiven for remarking that the percentage of alloy in "Newbigging's Fifth Edition" is practically *nil*. Mr. Walter King, of London, is the publisher, and copies may be ordered through us.

The franchises, privileges and property of the old St. Louis Gas Light Company were sold at public auction last Monday. President McMillin, on behalf of the Laclede Gas Light Company, was awarded the property at his bid of $4,000,000, which means that the Laclede is now in possession of the gas supply of the city. The price at which the property was purchased means a return of $333.50 for each share of old St. Louis stock. Only 305 shares of the original 12,000 shares, however, were without the possession of the Laclede Company on the day of the sale.

It is said that the authorities of Knoxville, Tenn., will bring suit against the Knoxville Gas Light Company for overcharges in the item of public lighting. The city claims that the contract calls for the use of a 5-ft. burner in the street lamps, and asserts that the Company has been using a 3½-ft. burner. The only difficulty in the way of the truth of this assumption is, according to our knowledge of the contract, that the city is supposed to and actually does the purchasing of the burner tips. In that light we presume the Company can hardly be held blamable for the city's lack of knowledge about burner tips, even supposing that but 3½ cubic feet per hour is the actual consumption rate instead of the 5 cubic feet called for in the agreement. The whole thing is likely a canard, and is based probably on the mouthings of some inspector that was discharged for cause. An investigation has been ordered. The payment rates at Knoxville are on the basis of a charge per lamp per annum.

Major Cantine, of the Alliance (Ohio) Gas Company, has determined to adhere to coal gas manufacture, and it is his intention to put a complete coal gas plant in position at that point next spring.

We understand that work on the main system of the Bay State Gas Company's proposed opposition plant at Wilmington, Del., has been suspended for the winter season.

The rate of increase in the quantity of gas sent out from the municipal gas works, Wheeling, West Va., is returned at about 14 per cent. for the year.

The Market for Gas Securities.

The city market for gas shares is about as shown in our report for last week. Consolidated maintains the recent advance, and Chicago Trusts are in better demand. Brooklyn shares are steady to strong, and but little stock is offered. In out-of-town shares we note that Washington, D. C., gas is very strong, a trade last week having been made in the stock at 218¾. Eastern shares are much higher, and there is very good reason for such strength, for the Companies' accounts almost invariably show that the increase in sendout for the year has been of the pronounced sort. The Brockton (Mass.) Company's regular quarterly dividend of 1¼ per cent. is payable on Thursday. The annual meeting of the Hackensack (N. J.) Company will be held on Jan. 13th.

[A Paper read before the Guild of Gas Managers.]

How a Dilemma in the Shape of a Shortage of Gas Coal was Surmounted.

By Mr. William Anderson, Marlboro, Mass.

To the Members of the Guild: Gentlemen—Having been forced, through an unexpected shortage of my regular supply of gas coal, to use Cumberland coal for a few days, your President requested me to give you the results of my experience. I am pleased to do this, in the thought that it may at some time be of value to those who should be unfortunate enough to find themselves in a similar position.

On the morning of November 21st, when I came into the works I found we had but 5,000 cubic feet of gas on hand, and nothing to inflate the holders with but Cumberland coal and a few barrels of gas oil. The fireman had charged the bench with a thousand pounds of the above coal before I arrived at the works—about 7 A.M. For three or four days previous I had been using half Youghiogheny and half Cumberland. I was sending out from 25,000 to 30,000 cubic feet per 24 hours, with a storage capacity of 18,000 cubic feet. I had but one bench of fives fired up, as I had been expecting coal every day, but it failed to arrive. Using the half-and-half mixture, I was able to keep the lights burning with the one bench. I was getting a yield of 4.74 cubic feet of 17 candle power, using 5 gallons of oil to the ton of coal. As soon as I arrived at the works I had the other bench of fives (in which were small retorts, 12 in. by 20 in. by 8 ft. long) fired up. It was an old bench which I had used two seasons, and called a "summer bench." I drove it for all it was worth to get the heat up in it as soon as possible. The first charge of all Cumberland went into the retorts at 6:30 A.M.; at 10:30 they seemed to be as fat, so to speak, as if they had been in but one hour, so I allowed them to remain for another hour, and then tried to take them; but I found they were still capable of making gas. On the 6th hour we snapped the lids, and when the coke was exposed to view the retorts were packed as full as they possibly could be—the coal had expanded so greatly. I used three gallons of oil with this charge, and I found I had made 4,400 cubic feet of gas—average of 4.50, coal and oil.

I thus found out that I could not charge more than one-half as much Cumberland to the retort as I could straight gas coal. I had been charging 1,200 pounds of Youghiogheny coal and 750 pounds of Cumberland, and even then the retorts contained in bulk more coke (with 750 pounds of Cumberland) than they did with 1,200 pounds of Youghiogheny. As the Cumberland was quite fine, I saturated each charge of 150 pounds with one-half gallon of oil; also used about 3 gallons with injectors, making 5½ gallons of oil to each 750 pounds of Cumberland coal.

As the day was cloudy, the shops were using the gas nearly as fast as I was able to make it. At 4 P.M. I had on hand 9,000 cubic feet; at 7 P.M. the holders were resting quietly on the bottom of the tanks. By that time I had been able to get a dull-red heat on the small bench which I had fired up in the morning, and I thought I would be able to make oil gas in it; so I saturated 100 pounds of Cumberland with about one gallon of oil, and charged each retort with it. In the other bench I was running 3-hour charges with about the same mixture. The candle power was about 20, and it was not until some consumers came to the works to find out what the trouble was, saying they could smell kerosene all over the town, that I thought it about time to let up on the oil.

It was then that I began to charge pure, unadulterated Cumberland, sending the gas direct from the retorts to the burners. Now it was when the real trouble began. Talk about light! It was from 1 candle to 12, at times—most of the time it seemed to me 1 candle. Well, how I managed to pull through I hardly know. We used, from the morning of the 21st to the morning of the 22d, 7,300 pounds of coal and about 40 gallons of oil; made 23,000 cubic feet of gas—an average of 3.15 for coal and oil. On the morning of the 22d I had on hand 3,000 cubic feet of gas of about 12 candle power. At 9:30 three cars of Youghiogheny coal arrived; so with 10 retorts I was able to supply the town with decent gas again. Of course, these results were obtained under very unfavorable circumstances.

Since then I have made some experiments with Cumberland coal, which I shall endeavor to give you a summary of. They were made under the most favorable circumstances, and are as follows:

Charged my small bench of 5's (12 by 20 retorts) with 100 pounds of Cumberland each. This bench is fitted with a set of sliding dip-pipes, of my own construction.

I charged at 10:45 A.M., and placed a Jones jet photometer at the outlet of the purifier, before entering the station meter.

The first hour's yield was	620	cu. ft.
The second " " "	1,620	"
The third " " "	2,340	"
The fourth " " "	2,470	"
Highest candle power obtained was	16	
Lowest " "	11	

The average yield was 4.94 cu. ft. to the pound, without the aid of any enricher. Coke obtained from 500 pounds of Cumberland, 16 bushels, or 64 bushels to ton of 2,000 pounds of coal.

The coke weighed per bushel, after being quenched, 38½ pounds; dry, 31 pounds. Making the coke from a ton of Cumberland coal weigh, when first quenched, 2,432 pounds; dry, 1,984 pounds.

Variations in the Products of the Destructive Distillation of Different Gas Coals.

At a meeting of the London Section of the Society of Chemical Industry, at Burlington House, Piccadilly, Mr. Watson Smith, Lecturer in Chemical Technology in the University College, London, read a paper entitled "Some Notes on Variations in the Products of the Destructive Distillation of Different Gas Coals, Heated Separately in the Same Retort and under Similar Conditions." The following is an abstract of the communication in question:

The author first of all directed attention to the "naphthaline nuisance"—a term which, as he truly said, is perfectly understood by every gas maker. Speaking of the cause of the nuisance, he referred to a case which came under his observation, in which a large heap of cannel was pointed out to him as having been exposed to a hot sun for some weeks; and it was suggested that coal thus aired and sun dried, would, at the high temperature of carbonization, suffer a more drastic carbonizing than coal in the usual condition of dampness, and hence give off more naphthaline. This deduction of his informant was plausible, though he imagined that all steam derived from hygroscopic moisture would have left the retorts before the formation of naphthaline could take place to any extent. But in any case the fresh charge of coal must cool the retort somewhat; and the formation of steam from moisture would certainly delay the rise of temperature to that usual as the full carbonizing heat. Hence if they took it that a coal, on the average, containing a certain amount of moisture was carbonized and yielded gas of the usual quality, and not excessively burdened with naphthaline, a coal of the same kind, but well desiccated, would suffer a more prolonged intense heat, though the firing arrangements remained constant; and the heat thus attained and prolonged might suffice to materially increase the naphthaline formed. But the hot weather and sun which caused the desiccation of coal exposed to them would also detract greatly from the efficiency of the atmospheric condensers, and would tend to warm up the rest of the apparatus; and if the supply of water to the scrubbers ran temporarily short, or if the usual and normal condensation by cooling were suspended for a time, then great risk was run of naphthaline being carried by the flow of gas into the mains in dangerous abundance; for they had a general concurrence of circumstances favoring deficiency of condensation. This was what he believed occurred in the case in question which came under his notice. When a certain ratio existed between naphthaline and the vapors of liquid hydrocarbon, and especially of those of carbolic acid and other phenols, he had found the naphthaline would not sublime and deposit in crystals. It seemed as if, at the moment of the formation of a minute crystal by sublimation and condensation, a minute quantity of naphtha was also condensed upon this point, and the crystal vanished, so to say, at the moment of formation; and a minute drop containing the naphthaline in solution was the result. But if the proportion of napthaline increased, a point would be attained at which its sublimation became possible, and condensation in crystals followed. There was no doubt that inefficient and insufficient cooling of the gas before its entry into the mains was a prolific cause of the naphthaline difficulty. It was also clear that, if the gasholders were not sufficiently large for the supply of gas required, and also to allow a certain reserve, proportionately larger for gases more troubled with naphthaline, then the settling and deposition of the naphthaline sublimate from the gas could never take place; for whilst there was a continual inrush of the gas, there would also be a continual outrush. Moreover the gas would be warm. If the entire plant was small in proportion to the demand for gas, not only would there be an excessive strain upon it, but the holder space would be too small during any such strain, and then the gas would be delivered after insufficient condensation and settling. During hot weather sufficient condensation therefore became almost impossible. Concluding this part of the paper, he laid

stress on the following points, which, he said, required attention to prevent the naphthaline nuisance: (1) The quality of the coals used and the coal mixtures; also the heat of carbonization. (2) The cooling and condensation of the gas. (3) The proportion of the plant to the gas supply required. (4) The proportion of the storage space to the gas generated and supplied. Concerning the benefit of using a mixture of coals containing a good proportion of cannel, which on distillation always yielded very liquid tars, the author said that vapors condensing to such liquid products washed or scrubbed down the naphthaline from the vapors of tars otherwise rich in naphthaline and proceeding from other than true cannels in the coal mixture used.

Turning to the question as to why naphthaline caused stoppages in service pipes, chiefly in the winter, the author said—supposing naphthaline, through insufficient condensation and cooling in summer, was carried into the mains—a hot summer would mean plenty of daylight, and little gas consumption; and hence only a slow current of gas in the mains. But in the winter, there would be a rapid current of gas. If then the accumulated naphthaline were imagined lying about like snow drifts, whilst a slow current would not disturb them materially, at the period when some tens of thousands of gas burners were lit up in the winter, they might fancy something like a "gust" of gas carrying along the naphthaline crystals farther and farther into the service pipes, and at last causing stoppages in them.

The statement made to the author, to the effect that coals differed as to the amounts of naphthaline contained in them, led him to consider whether it might not be possible that different coals, carbonized under like conditions, yielded varying amounts of naphthaline and also other products. This idea formed the basis of a series of experiments that was proposed to a large gas company whose customers were plagued by naphthaline. The company had an experimental plant, the retorts being of cast iron. The proposal was to carbonize 5 cwt. of each kind coal used separately, in order to collect the gas, tar, and liquor, and to send him (Mr. Smith) a sample of each tar in which he was to determine the amount of naphthaline. Each variety of coal of seventeen different kinds was thus treated, representing the typical cannels and gas-producing coals in the northern coal fields of England. All these coals passed under the same treatment and through the same retort, so that the conditions as to temperature of distillation might be regarded as identical. Many people were not aware of the great influence which the physical or chemico-physical properties (for lack of a better term) of different coals had upon the products of their destructive distillation. Supposing a gas retort charged with an ordinary bituminous coal, not distinctly a cannel, but approaching it, and destructive distillation to follow, and again supposing it were charged with pronounced cannel coal, and again carbonized precisely as in the former case, or at a still more elevated temperature—in the first case they would get a tar high in specific gravity and rich in naphthaline and anthracene, but deficien in paraffins and middle oils. In the second case the specific gravity of the tarwould be low; paraffine would be plentiful, to the detriment of the anthracene; and anthracene and naphthaline, scarce. Moreover, the light naphthas with middle oils would be plentiful. The specific gravity of the rectified benzenes in the first case would be .880 to .890; but in the second it might be about .870, or even lower. In the first case the cresote oil would, on cooling, partially solidify from crystallization of naphthaline; in the second case, even on cooling, crystallization might not take place. A sample of the clear reddish oil distilled, and the latter small portion taken, boiling at °210 to 250°, might solidify on cooling; but it would present the appearance of a greasy thick mass without much crystalline appearance and contain a mixture of naphthaline and paraffine. He (Mr. Smith) well remembered the time when Graebe and Liebermann's great synthesis of artificial alizarin was first effected. He was then Chemical Manager of a tar distillery near Manchester; and he recollected the trouble caused by the anthracenes obtained from the tar of the gas works of the Manchester Corporation, where Wigan cannel was principally used. The difficulty was only overcome by mixing less bituminous coals with the cannels for charging the retorts.

Adverting to the investigations with which the paper mainly dealt, Mr. Smith observed that as soon as they learn that not only did variation of temperature of destructive distillation affect the yields and characters of products, but also variations in the physical characters of the coals used, they became impressed with the fact that the question was a more complex one than might have at first sight appeared. With regard to the coals employed, there were 17 varieties, the results of his experiments with which (in 1887) he tabulated as follows:

Number of Sample.	Yield of Gas per Ton. Cubic Feet	Illuminating Power. Candles.	Ammoniacal Liquor.		Tar.		Actual Specific Gravity of Tar.	Percentage of Naphthaline.
			Gallons.	Specific Gravity. Deg. Twaddel.	Gallons.	Specific Gravity. Deg. Twaddel.		
1	10,442	15.16	20.0	2	....	36	1.191	4.67
2	9,920	27.70	21.3	3	11.8	34	1.182	3.94
3	10,826	24.23	18.6	2.5	11.1	32	1.175	4.85
4	10,590	14.22	12.3	4	9.1	37	1.186	4.06
5	10,716	15.13	12.0	4	8.1	36	1.196	5 32
6	10,890	14.68	13.3	3.5	10.0	37	1.201	6.00
7	10,786	14.92	16.6	4.5	10.5	36	1.193	5.39
8	10,733	14.76	15.0	3.5	9.3	36	1.190	5.20
9	10,906	14.51	12.0	4	7.5	36	1.187	3.52
10	10,200	15.71	17.3	4.5	12.6	34	1.178	4.00
11	10,946	14.63	13.3	4.5	9.0	35	1.186	4.56
12	10,333	15.44	14.6	4	10.0	35	1.187	5.26
13	10,760	14.99	15.0	3.5	9.2	35	1.180	4.63
14	9,666	26.78	25.6	3	14.8	30	1.170	4.13
15	10,280	25.06	26.0	4	14.6	29	1.167	3.18
16	9,746	25.97	27.0	3.5	14.0	31	1.164	2.68
17	9,333	29.09	22.3	3.5	10.8	31	1.147	3.15

The author directed attention to the figures in the table for specific gravity and percentage of naphthaline, which showed, he said, that they fitted together remarkably well—rising and falling together. This he more clearly indicated by a table, in which the specific gravities were placed in order of magnitude; and it was seen that, as these numbers rose, so the figures representing the naphthaline rose—not precisely in all cases, but very nearly so. For the specific gravities of the tars at the works, Twaddel's hydrometer was used; but Mr. Smith weighed a known volume of each tar—viz., 700 cubic centimeters—at a time. The second mode might, remarked the author, be taken as being about accurate; and he pointed out that the figures showed, on comparison with the Twaddel degrees, how very inaccurate a method of determining the specific gravity of so thick a fluid it was to use the hydrometer. It would be observed from the table that the coal which, whilst emitting at the given temperature a good volume of gas of excellent illuminating power, yielded also a minimum of naphthaline, was No. 15. It was clear from the results given that—

(1) Good condensation must be adopted and maintained uniformly if naphthaline in dangerous preponderance was to be kept out of the gas.

(2) That it was possible to select a gas coal or mixture of gas coals which would, other circumstances being equal, yield, with good illuminating gas, a fair minimum of naphthaline.

(3) That in the specific gravity of the tar produced, a fair criterion was afforded as to the amount of naphthaline present in the tar. He was here referring exclusively, of course, to benzenoid tars.

Speaking of the effect of carbonizing at high temperatures, irrespective of the quality of the gas coal, Mr. Smith alluded to the results of experiments embodied in the paper read by Mr. Lewis T. Wright before the Society in 1888. In that paper was given an analysis of a tar obtained from a mixture of Yorkshire and Derbyshire coal distilled at a high temperature (specific gravity of the tar, 1.23). The results of distilling the tar were as follows:

	Per Cent.
Ammoniacal liquor	4.39
Crude naphtha	4.11
Light oil	—
Creosote oil	18.99
Anthracene oil	12.14
Pitch	59.14
	98.77

Mr. Wright observed in his paper: "Here the light oils are practically absent; and as soon as the crude naphtha (rich in benzines) had come over, solid naphthaline made its appearance." The author's examination of tar (specific gravity, 1.2) produced from Staffordshire coal carbonized at a high temperature in Simon-Carves' coke ovens, gave the following results:

		Per Cent.
Ammoniacal liquor		4.39
Crude naphtha (sp. gr. .950)		9.70
Distilling over, below but up to 300° C.	Light oils	—
	Creosote oils	22.70
Above 300° C. (Anthracene oil)		10.70
Pitch		52.51
		100.00

Thus there were no light oils, and scarcely any heavy oils; for the so-called creosote oil was a greasy solid, or semi-solid mass of crude naphthaline. The anthracene oil was also a semi-solid mass. No doubt, continued the author, the temperature here had even exceeded that employed by Mr. Wright in carbonizing his coal. The similarity of results was somewhat conspicuous; and the tendency of *yet higher temperatures* had been to still further accentuate the absence of oils—both creosote oils and anthracene oils, as well as ordinary light and heavy oils. Other differences in results would be due to the different qualities of the coals carbonized. The crude naphtha obtained as above and of specific gravity .950, yielded 79.5 per cent. by volume of naphtha, and 2.16 per cent. of crude carbolic acid, or 0.14 per cent. on the tar. He could thus by these results of his confirm Mr. Wright's observation as to the *apparent* diminution of the tar acids (phenolic bodies), as well as middle oils, to increase of temperature; and gas retort tar generally contained 0.5 per cent. of crude carbolic acid, as against the 0.14 per cent. he obtained in the Simon-Carves oven product. Probably, though, as he had yet to show, neither Mr. Wright nor himself sought for the carbolic acid in the right oils in the above cases; and they did not obtain all there was in such case. The other results with the crude naphtha were:

Temperature. Cent.		Per cent. by volume.	
Below 100°	....	1.36	
" 110°	....	8.84	
" 150°	....	38.09	63.29
" 200°	....	15.00	
Above 200°	....	36.71	(chiefly naphthaline).
		100.00	

Alluding again to the table, it would be seen, said the author, that great variations in the quantities of tar occurred, which could not be fully explained by any reference to either volumes of gas obtained, the illuminating power of the same, or by reference to the specific gravities of the tars, or the amounts of naphthaline—whether any of these were taken singly or in conjunction. He took it therefore that the volumes of tar obtained (the carbonizing heats being about the same) were functions of the physical and chemical conditions of the coals employed; and hence they might say that in carbonizing coal for the sake of aromatic tars a selection of a special coal among many kinds of coal might be reasonably sought for. They found in the table, for example, that whilst No. 9 yielded only 7.5 gallons of tar per ton. of specific gravity 1.187, No. 14 gave 14.8 gallons, of specific gravity 1.170—*i. e.*, nearly double the amount. If the table was arranged in the order of the specific gravity of the tars obtained a curious fact was brought out, viz., that whilst the tar of lowest specific gravity corresponded to the smallest volume of gas obtained of highest candle power, yet it had not followed that naphthaline should be present in least percentage in that tar, nor had it followed that the tar should be smallest in percentage amount on that coal. Nevertheless, the yield of tar was good in this case; and the amount of naphthaline was smallest in amount, save in one case. It would seem that some coals might be carbonized at a high temperature, and a large volume of gas obtained of rather low illuminating power. A considerable volume of tar containing much naphthaline might also be obtained, and so a thick tar. In short, it would appear that some coals had a greater tendency at high temperatures to produce naphthaline and similar high boiling hydrocarbons (naphthaline and anthracene, he mentioned, stood together in these remarks) than others, whose tendency was to be more refractory on destructive distillation in this respect, and by preference to form bodies of the phenolic type and benzine hydrocarbons—the phenolic bodies breaking up in accordance with Schulze's hypothesis into benzine and other hydrocarbons, and these or some of them probably passing off more largely with the gas, increasing its illuminating power, as seen in the table. It must, he said, be plain that, on the whole, the thinner tars—hence containing bodies of lower specific gravity—corresponded to the gases of highest illuminating power collaterally produced. These thin tars were always characteristic of the true cannel coals, such as the Wigan cannel, and they knew that such coals yielded high illuminating gas. What would strike them most in the table was that in spite of the variations referred to they saw strong evidences of the general rule that, with a tar of moderate specific gravity (1.16 to 1.17), they had a large yield of that tar, a good yield of gas of high illuminating power, and a moderate amount of naphthaline, with doubtless a good yield of anthracene, and a fair amount of benzine and carbolic acid; whilst with one of high specific gravity the gaseous volume was larger, illuminating power smaller, naphthaline and anthracene larger, and the amount of tar obtained smaller. The special deviations from the rule, the author believed, indicated differences in the properties of the different coals used, and showed that within the general rule there was room for selective improvements and advantage.

The concluding portion of the paper consisted of "a more special consideration of the tar constituents." By distilling off the crude naphtha and light oil, including some creosote oil, and measuring them, the amounts of these constituents were determined. As crude naphtha, all that coming over on distillation below 180° C. was measured. As to the remaining oil, it might be said that it consisted of light oils, including some heavy oils, and the bulk of it sank in water. The amounts were measured and were given in a table by the author, so as to follow with the specific gravities of the tars taken in increasing order. It was seen thereby that as the tar rose in specific gravity there was clearly a tendency to a falling off in the quantity of crude naphtha and of light oils; but variations were very perceptible, depending, no doubt, on the varieties of coal carbonized.

The following figures are taken from the table alluded to, and the other particulars referring to the various samples will be found in the first tabulated statement:

	Gallons per ton of Tar. Light Oils Distilling	
No. of Sample.	Below 180°. Crude Naphtha.	Above 180°. Heavy Oil for Carbolic Acid.
17	7.4	21.5
16	8.4	21.0
15	1.4	26.4
14	5.0	21.5
3	6.0	23.0
10	7.1	30.0
12	4.2	18.0
2	7.1	11.6
11	1.4	21.5
4	3.8	20.5
9	5.3	13.7
12	4.1	19.0
8	2.1	17.0
1	3.2	5.6
7	4.5	15.5
5	5.0	16.0
6	4.0	13.3

In conclusion, Mr. Smith thanked his assistant (Mr. Hamilton) for the intelligent help he rendered in carrying out most of the experiments reviewed in the paper.

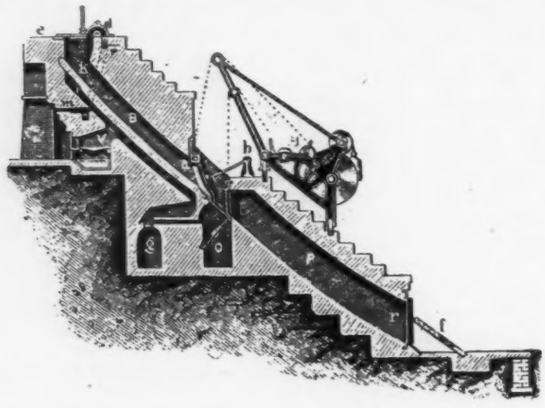
The Chairman (Mr. David Howard) said he had to thank Mr. Smith for his valuable contribution to the subject of the chemistry of gas production. This was one of the most complex questions one could deal with. It would be sufficiently difficult to grasp the entire problem were there only one series of homologues; but where there was a reaction which produced several series of homologues, the number of unknown quantities in the equation became perplexing—almost beyond solution. Those of them who had had any experience with naphthaline in pipes would have a very keen idea of its nuisance, as it always appeared to find out the most awkward points. It was a very interesting question, and one which he did not think had been fully worked out—the influence of the solubility of one gas constituent upon another in vapor. It appeared to him that, speaking generally, they might have a gas containing more

than one series of the homologues of different series retaining one another in solution of vapor, while the homologues of the same series tended to turn one another out. There was evidently some complication of the laws of the solubility of gases in vapors. This might perhaps explain why the analysis of gas varied so enormously. They would find, for instance, that in the coal gas of Paris, London and Manchester the proportion of volatile constituents which were in it varied so extraordinarily much that the Paris analyses had been frequently challenged on the ground that they were impossible.

Discussion was invited, but no one responded. The Chairman, however, said he hoped the paper would be discussed on a future occasion after the members had had an opportunity of considering the questions dealt with.—London *Journal*.

System of Inclined Coke Ovens for Gas Works.

The oven shown in the illustration, according to the *American Manufacturer*, is a modification of the older Pauwels and Dubochet oven which was described by M. S. Jordan, C.E., in the course of his lectures on metallurgy, at the Central School of Arts and Manufactures of Paris. Messrs. Pauwels and Dubochet have been long identified with the illuminating gas industry in Paris, and their coke ovens were invented for the purpose of producing illuminating gas at the same time with a good metallurgical coke. In 1878 there were at the La Villette gas works, of



Paris, 56 ovens of the original form, arranged in four rows and served by four pushers. It is our intention at present to describe only the modification of the original form.

This modification is distinguished mainly by its inclined position, as shown in the accompanying section.

The purpose of the inclination, which is slightly curvicular, is, of course, that the operation of pushing out the finished coke may be assisted by gravity.

The coking chamber in these ovens is heated by an external coke fire, the coke being supplied from the gas retorts of the Parisian gas works, in connection with which the ovens have been constructed.

The coking chamber is two meters in width by seven meters in length and has a capacity of six tons of coal. The coal is charged through the trap-door between *e* and *d*, from trolleys passing along the top of the oven structure. The external coke fire is built on the hearth *V*, and the heat therefrom is communicated all along the bottom of the oven through the flues *i*. If the gases generated from the oven are not used for illumination they may be used for further heating the oven itself, as is the case with Belgian ovens. Should this latter be desired, the gases may be led through a flue from *n* to *m* and thence reach the flues under the bottom of the oven.

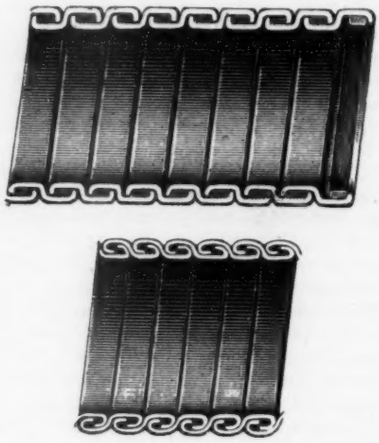
The ovens are, as usual, arranged in batteries, and are discharged by mechanical pushers introduced from above. Here follows a peculiar feature of these Pauwels and Dubochet ovens. As is well known, coke from Belgian ovens has not the special advantage of coke from bee-hive ovens in the metallic luster peculiar to the latter variety. This metallic luster, it is claimed, is due to the fact that bee-hive coke is quenched *in the oven*. Belgian coke, on the other hand, must be drawn before it is quenched, lest the water used in quenching damage the lining of the oven and cause disastrous cracks and leaks in the flues.

Messrs. Pauwels and Dubochet overcome this difficulty in the following way: Immediately below the carbonizing chamber *B* is a quenching and cooling chamber *P*. When the operation of coking is finished, the lower door *a* of the carbonizing chamber is raised by the derrick shown above, which may be moved along from one door to another for the purpose, and then the coke falls or is pushed from the chamber *B* to the lower and larger chamber *P*. In this latter the coke is covered with ashes and allowed to cool for, usually, 24 hours. The resulting coke is silver gray in color and very clean. It is hard and sonorous and breaks off in large pieces. After the cooling is accomplished the door *r* is opened, and the coke falls to the shovel.

The coking lasts 72 hours, and during that time the external coke fire consumes 98 bushels of gas coke, or 33 bushels per ton of coal in the charge. Each oven costs $300. There are produced, per ton of coal in the charge, 1,386 lbs. of large coke, 81.4 lbs. of small coke, 68 quarts of breeze and 110 lbs. of tar. The yield of gas is 12 per cent. less than is obtained from retorts. The gas, if used for illumination, must be drawn from the oven by means of an exhauster, which works at the expense of 6 to 7 cents per 100 meters of gas.

Cammell's Flexible Metallic Tubing.

A new and ingenious form of flexible metallic tubing has been invented by Mr. T. Irving Cammell, of London, England, and his form of patented goods is being largely availed of in England and France. This tubing can be made to bear any desired pressure, and yet weighs no more



than india-rubber tube of the same strength. It is applied with equal facility for the conveyance of gas, of steam, and of water for hydraulic cranes and similar uses. The annexed engravings show the construction very clearly. A strip of metal—it may be brass, bronze, gun-metal, or galvanized steel—is fed through rollers which bend it into double channel section, and then it is wound on a mandrel, the edges of the channels being turned over and interlocked at the same time. A strip of jointing material, such as india-rubber, asbestos, whipcord, or catgut, is laid into the bend to insure tightness. When the pressure to be dealt with is considerable, say from 10 lbs. to 1,000 lbs. per square inch, the pipe may be of great flexibility, and the interlocking be comparatively loose, as shown in the upper figure. For low pressures interlocking is carried out more completely, as shown in the lower figure, and two strips of jointing material are used. This latter form of tubing is also available as suction hose. The length of pipe which can be made in one piece is only limited by the lengths in which the metal strips can be obtained. For light pressures the lengths are coupled by solid unions, into which the ends of the piping are screwed and soldered. For heavier pressures the pipes are passed into a nipple, and a joint made round them by an asbestos packed gland.

The flexibility of this piping is most striking, while its price compares favorably with first-class india-rubber hose. It is made regularly in all sizes from ¼ in. in diameter up to 4 in., and much larger sizes can be produced without difficulty. It has now been subject to three years' severe test in different works, and there should be thousands of purposes for which it is far better adapted than anything in the market. As a mechanical curiosity it is most interesting, while it promises to be of very great practical utility.

THE new dynamos recently ordered by the Congaree Gas and Electric Light Company, of Columbia, S. C., have been placed. The inhabitants now can have incandescent electric lighting in any desired quantity.

Useful Hints for Engineers.

Messrs. J. B. Lippincott, Phila., Pa., have published a manual of machine construction for engineers, draughtsmen and mechanics, by Mr. Jno. Richards, which is replete with matter valuable to those who have to do with any or all of the subjects treated. We make the following extracts from it:

Notes on Steam Engines.—The power of an engine is rated from three things,—namely, the pressure of the steam, the area of the piston, and the speed at which it moves.

These things taken together, make up, or indicate, with certain allowances, the actual work an engine will perform. The power of an engine is affected directly as either of these three things are varied.

The amount of useful power given off is less than that indicated. Ten per cent. or more is lost in friction and the resistance of transmitting gear.

Nominal horse-power, now almost out of use, relates to a certain amount of cylinder capacity. It is a commercial term employed to designate the size of engines.

High piston speed reduces the weight of an engine accordingly, and high rotative speed reduces the weight and cost of main shafts, fly wheels, and other transmitting gearing.

Roughly estimated, three square inches of piston area represent one nominal horse power, and one and a half square inches an indicated horse power. This supposes average working conditions.

For pumping water the duty of engines is commonly rated in foot pounds for each one hundred pounds of coal. The average duty of Cornish engines is from 70,000,000 to 85,000,000 pounds.

For engines exceeding fifty horse power, condensing apparatus should be employed in all cases where water is obtainable. The additional mean pressure gained, or saved, is from ten to thirteen pounds per inch.

The amount of feed water required for engines working under fair conditions is from 17 to 30 pounds, or 2 to 3.6 gallons an hour for each horse power. For condensing the amount of water required is twenty-times as much.

The amount of good coal required for an engine of fair economy is two to four pounds per hour for each horse power. The best marine engines of the present time consume less than two pounds.

The capacity of boilers is usually computed from the amount of heating surface exposed to the fire, the average being one horse power for each fifteen square feet of heating surface.

Nominal Horse Power.—This term is employed as a measure for the size of engines, and relates to the cubic contents of cylinders. It has almost gone out of use, because the conditions of speed and pressure assumed do not apply to modern practice. For commercial purposes and for those not acquainted with mechanics, it is a convenient form for defining the size of engines.

The nominal horse power of a modern high-pressure engine is about four-tenths of its actual power. A rule for computing is to multiply the square of the cylinder's diameter in inches by the cube root of the stroke in feet and divide by four.

Indicated Horse Power.—This term is employed to define the pressure exerted by the pistons of engines, and is the mean pressure multiplied by the area of the piston in inches and by the velocity in feet per minute. This gives foot pounds—that is, pounds raised one foot high in a minute. 33,000 of these foot-pounds are estimated at one-horse power, so that by dividing by this number gives indicated horse power.

Actual Horse Power.—From the indicated power of an engine there must be deducted certain losses by friction in the engine, friction of transmitting machinery, clearance at the ends of the cylinder, and leaks; so the actual performance of engines, estimated from a second mover, is commonly ten per cent. less than the computed or indicated power.

Indicating Diagrams.—The working power of engines is seldom computed, but ascertained by means of indicators, which produce a diagram described directly by the pressure in the cylinder. A small piston is exposed to the same pressure, and acts against a spring of known resistance. The movement of this small piston is transcribed on a piece of paper having a movement coincident with the engine piston.

By measuring the movement of the small piston at various parts of its stroke the corresponding pressure in the main cylinder is found. Various other conditions of an engine's operation are ascertained in this way. The subject is too extensive to be treated here, and should be studied from books devoted to it.

The Flow of Steam.—The velocity at which steam flows in pipes and through apertures is governed by the same law as the flow of liquids, if the gravity is considered. It is more convenient, however, to compute the flow from temperature as follows: $V = 60\sqrt{T+460}$, or the velocity per second equals 60 times the square root of the degree of temperature with 460 added. The flow is nearly uniform at different pressures, and the following table will answer for nearly all cases without further calculation:

Pressure in lbs. per inch.	25	30	45	60	75	100	150
Velocity in ft. per second.	863	867	877	885	891	898	908

Mean Effective Pressure.—The following table shows the mean or average pressure in a cylinder when steam at various pressures is cut off at different points of the stroke:

Initial Pressure of Steam in pounds.	Portion of the Stroke where Steam is cut off.					
	3-4th	5-8th	1-2	3-8th	1-4th	1-8th
20	19.3	18.4	16.9	14.8	11.9	7.7
30	29.0	27.5	25.4	22.3	17.9	11.5
40	38.6	36.7	33.8	29.7	23.8	15.4
50	48.3	45.9	42.3	37.2	29.8	19.2
60	57.9	55.1	50.7	44.6	35.7	23.1
70	67.6	64.3	59.2	52.1	41.7	26.9
80	77.3	72.5	67.7	59.5	47.7	30.8
90	86.9	82.7	76.1	66.9	53.6	34.6
100	96.6	91.5	84.6	74.4	59.6	38.5
110	106.2	111.1	93.1	81.8	65.6	42.3
120	115.0	110.3	101.5	89.3	71.5	46.2
130	125.6	119.1	110.0	96.7	77.5	50.0
140	135.2	128.6	118.5	104.1	83.4	33.9
150	144.9	137.8	126.9	111.6	89.4	57.7

Area of Steam Ports.—The area of steam ports is from $\frac{1}{15}$ to $\frac{1}{25}$ the area of steam cylinders, according to the speed of the piston and some minor conditions.

From the table given it will be seen the flow of steam is almost independent of pressure, so the area of passages depends upon volume alone. Volume being a resultant of piston area and speed, the size of ports is found from area, stroke and revolutions multiplied together.

The following rule accords with common practice: Multiply the area of the cylinder in inches by the stroke in inches and by the number of revolutions per minute, then divide by 35,000 for steam ports and by 27,000 for exhaust ports.

Pipes should be 50 per cent. more in area.

Example.—Cylinder, 12 inches diameter; stroke, 24 inches; 120 revolutions per minute.

Area $= 113 \times 24 \times 120 = 325440 \div 35000 = 9.29$ inches, area of steam ports.

$325440 \div 27000 = 12.05$ inches, area of exhaust ports.

Fuel Gas for Household Use.

Prof. Elias Colbert recently appeared before a committee of City Councils of Chicago, the subject under consideration being the gas supply. He remarked that the great value of good fuel gas as compared with coal for domestic purposes lies in the fact that the ordinary grate does not utilize more than about 5 per cent. of the heat energy that is stored in the fuel. It sends nearly 50 tons of heated air and unburned material up the chimney for each ton of coal. The best stoves and furnaces seldom utilize more than 7 or 8 per cent. On the other hand, 75 per cent. of the heat force contained in the gas can be actually used for warming or cooking. Fifty per cent. is a moderate allowance under ordinary conditions in the use of gas, especially if the opening be so constructed as to permit the escape of no more heated air than is necessary to steady combustion. This is where the saving comes in. There is no manufacture of force in the process of gas making. We can no more increase the original energy that is locked up in a given quantity of fuel than we can invent perpetual motion. In fact not more than three-fourths, and often not much to exceed half of the force in the coal is to be found in the gas. The rest is lost in the conversion from solid to gaseous fuel. But if the change be effected at the minimum of cost the fuel cost of gas in the holder will still be less to the ordinary domestic consumer than is its coal equivalent in the yard of the dealer, and the cost of distributing the gas through the pipes and mains of a large city is really less than that of hauling and carrying in the coal.

Many people talk about 1,000 feet of gas as if its value for fuel or illuminating purposes were nearly as much of a standard quantity as is the pecuniary value of a gold dollar. This is an error. You can get anywhere from 8,000 to 10,000 feet of gas out of the same ton of good quality of

coal with little or more heat energy in the larger quantity than in the smaller one. Probably the most useful in proportion to its bulk would be that of which not less that 30,000 feet nor more than 50,000 feet were obtained from a ton of good Illinois coal. Taking the inside figures at $1.50 per ton for material the cost would amount to 5 cents per 1,000 feet, which need not be increased by a partial substitution of crude petroleum. The cost of labor and other incidentals need not exceed another 5 cents, the sum of the two being the cost placed in the gas-holder. Chemically considered, it would require about 55,000 feet of this gas to equal the ton of coal. Applying the before stated percentages for waste in two cases, we shall see that some 90,000 feet would be used and wasted in obtaining the ton's worth of energy; and a ninth part of that, or 10,000 feet, would yield more heat than is obtained from the same ton of coal in the ordinary grate or house stove. Doubling that, for safety and to cover cases in which the saving may be claimed to be greater, we get an allowance of 20,000 feet, or about 800 pounds in weight of gas, as fully equal in value to the 2,000 pounds of coal.

The cost of distribution varies widely with the quantity supplied to consumers in proportion to the area occupied by them. It would not exceed 3 cents per 1,000 feet if the gas were in general use by the people of this city for fuel purposes. A rough calculation shows that the residents of Pittsburg and vicinity were served with natural gas at that rate during the first two years, measuring the acknowledged receipts by the companies against the estimated consumption and allowing one-fourth for waste and overestimates. (They did not use meters then, but do now, and charge 10 cents per 1,000 feet.) This paid interest on the capital invested in wells several miles distant and in mains to bring the gas from those wells in addition to the mains and distributing pipes within the city. We may look at the question of capital directly. It has been claimed that Pittsburg and vicinity have used and wasted 500,000,000 feet per day. Suppose that Chicago, with twice as many people, uses only half as much, that is only 90,000,000,000 feet per year, 1 cent. per 1,000 feet on which yields $900,000, or interest at 5 per cent. on $18,000,000, the latter sum being little, if any, less than the actual first cost of the required plant. Add as much more to cover wear and tear, and still another cent for clerical force and superintendence of distribution, and we have five plus five plus three equals 13 cents per 1,000 feet as the total net cost on a moderately large supply.

Suppose it to be 15 cents per 1,000 feet—and it ought not to exceed that at the beginning—we should then have 20,000 feet, costing $3, having a usable fuel value of not less than one ton, and in many cases rising nearer to two tons of coal, according as the latter has been used more or less wastefully in the household. And with this would be avoided the trouble and annoyance of carrying in coal, taking out ashes, and risk of indictment for committing a smoke nuisance, to say nothing of the benefit to be derived, in common with other citizens, from breathing a purer atmosphere. The saving to manufacturers would not be so great as in the household, but in the latter it would be an important one, the family consumption alone averaging fully two tons of coal per head per annum.

SPECIAL ENGLISH CORRESPONDENCE.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, Dec. 9, 1889.

The Dinsmore Process.—Extraordinary Fatality at the Leeds Forge.—Mr. John Methven on "Photometry."—Gas Stokers and their Employers.

At the meeting of the Manchester District Institution of Gas Engineers, held at Manchester, on Saturday last, the chief item on the programme was a paper by Mr. Isaac Carr, of Widnes, on the Dinsmore Process, which aims at increasing both the yield and the quality of the gas obtained from a given weight of coal, at the expense of some 30 per cent. of the tar. As originally proposed by the patentee, this desirable result was effected by admitting a small stream of tar into a red-hot retort or duct, then causing the gases or vapors to pass through one or more "ducts" in order to fix them. The "ducts" may consist of specially made tubes of fireclay, or an empty retort of appropriate section would answer the purpose, the object being to expose the crude gases to a temperature of 1,800°, or thereabouts, which is represented by the somewhat indefinite term "a light cherry red." Under the hands of Mr. Carr, who has been experimenting on a practical scale with the process for some months, it has been considerably modified and improved. The two chief features introduced in the course of practical operations, are the treatment of the crude gas fresh from the retort, so that the tar, if one may use the term, is operated upon in its original vaporous state, instead of being allowed to condense, and subsequently revaporized. The advantage of this procedure, as avoiding business of the "Richard, Duke of York," kind, will be obvious to all. The other feature is an adjustment of the temperature of the duct, secured by surrounding part of it with fireclay tiles or bars, so that the following gradations of temperature may be as nearly as possible obtained:

Two-thirds of the length from the inlet, from 1,700° to 1,800° F., or a bright cherry red, and cooled down at the outlet end to about 1,200° to 1,300°, or a dull red.

Mr. Carr's arrangement of the Dinsmore apparatus consists of a bed of seven single retorts, two tiers of three on each side, and one retort in the center at the top, which serves as the duct. The usual ascension and dip pipes are provided to the six retorts, each of which is also furnished with a short connection, carrying a cast iron cock, connected to a sort of collecting chamber attached to the mouthpiece of the duct. If the cock is closed on any one retort, the gas escapes by the ascension pipe to the hydraulic in the usual way; but if it is opened, the gas by preference passes through into the collecting chamber and along the duct. Or if by reason of any accident or stoppage occurring in the duct or its connecting pipes, the gas could not pass that way, the hydraulic seal would come into play as a self-acting safety by-pass, and allow the gas to pass off without loss. The back end of the duct is also furnished with a mouthpiece, which carries a large size ascension pipe surrounded by a water jacket, communicating with a collecting main. The water jacket is claimed to be effective as a preventative of stopped pipes, so the apparatus comprises both an anti-dip arrangement and a cure for stopped pipes. One of the six retorts is charged every hour. Before slacking the lid, the cock leading to the collecting chamber is shut off, and immediately the charge is in and fastened up, it can be opened again. By this means a practically constant supply of gas passes through the duct, one hour with another.

Mr. Carr finds that the advantages offered by this arrangement are an increased yield of 10 per cent., and an improvement of 20 per cent. in quality; so that a coal that under ordinary working gives 10,000 cubic feet of 16-candle gas, will give 11,000 cubic feet of 20 to 22-candle gas by the Dinsmore process. Those advantages can be applied in various ways according to individual requirements. The quality of the gas supply may be increased to the extent of 20 per cent. by the adoption of the process throughout, or in any less degree by using an appropriate proportion of Dinsmore beds. For example, at Widnes Mr. Carr is at present using 5 beds of the kind above described in conjunction with 12 of the ordinary beds, and is thus able to improve the quality of the gas supply to the extent of 1½ candles—from 18 to 19.5. In other towns where no demand for an improved quality existed, the process would admit of the substitution of an inferior and cheaper coal, or enable the use of cannel to be dispensed with. It is especially worthy of commendation to all who desire to supply a high quality of gas, and at the same time do not wish to increase their dealings with carbonic oxide.

At present experiments with it have been confined to coal obtained in the neighborhood of Widnes only; but the results above noticed have induced other engineers to take up the process, and it is likely to be applied at several gas works without delay. There is no reason why it should not be adapted to various kinds of oils as well as to coal. A singular feature is that the specific gravity of the gas is very low, not exceeding that of 14-candle coal gas. A sample indicating 22-candle power at the photometer has a specific gravity of 0.420, whereas gases of that quality usually range about 0.530 to 0.550. This, together with some other points in Mr. Carr's paper, suggests several theoretical considerations of an interesting character, into which considerations time and space do not permit me now to enter. The low specific gravity is a decided advantage in distribution. Gas engineers want quality and quantity, and as long as they get these the less weight the better.

Public attention has been directed towards the probable danger attendant upon the use of water gas in connection with industrial pursuits by a remarkable occurrence at the works of the Leeds Forge Company, where it is known that water gas is largely used. Mr. Samson Fox, who has lately been so prominent in endeavoring to introduce and extend the use of water gas, is managing director to the Company, and frequently refers to the works in question as an example of its practical application. Two workmen were found dead in a tool house, under circumstances which gave rise to the suspicion that the fatality had been caused by water gas. The bodies were removed to a band room on the premises ready for the post mortem examination which was ordered by the coroner in the usual way. A party of five surgeons and three assistants attended, two days after the sad event, for that purpose, but had barely commenced their work when one of the assistants fell to the ground in an unconscious state; while attending to the sufferer another

gentleman was attacked in a similar manner, and the whole of the party became more or less indisposed, suffering from sickness, headache, constriction of the chest, etc. So it was necessary to postpone the examination. It was observed, however, that blood from one of the men had the peculiar "cherry-red" color which has been observed in cases of carbonic oxide poisoning, and that the odor from alcoholic poisoning was absent in both instances. A temporary tent was erected in the adjoining yard, and the medical examination was completed on the following day without further accident. As the judicial inquiry into the cause of death is not yet completed it would be premature to offer further observations on this matter.

Relations between gas stokers and their employers do not improve, thanks to the exertions of the labor agitators. At Manchester and Salford all the regular retort house workers have gone out on strike, because they refused to work with men who would not join the "Gas Workers Union," and the Committee, on their part, could not see their way to discharge men who had given no fault in connection with their duties. Fresh workmen have been engaged, and endeavors are being made to carry on the supply of gas. The South Metropolitan Gas Company are in much the same predicament. Here the cause of offence is a scheme introduced by Mr. G. Livesey, the Chairman, with the object of giving the workmen some interest beyond their mere wages, in the prosperity of the concern. This scheme is not viewed with a favorable eye by the union, and therefore the union men have handed in their notices. The same have been accepted by the Company, who intend to follow the same course as that adopted at Manchester, and are making endeavors to secure fresh hands. Amongst other things they are advertising in the provincial papers, offering special inducements in the way of homes, besides the high wages at present paid, to any able-bodied laborers who will step in the gap. Truly the times are becoming favorable to inventors of labor-saving appliances in gas works, and to the introduction of water gas or other schemes that bring with them a marked reduction in the weekly wage sheet.

A paper read by Mr. John Methven at the recent meeting of the Southern Association of Gas Managers, on the "Photometer," forms a most important and valuable contribution to that subject, as serving to explain many of the discrepancies that occur in practical operations, and which for some reason or other, it has lately been the fashion to ascribe to the vagaries of the standard candle. Having frequently protested against the injustice of burdening the candle with the sins of the whole apparatus, it is a matter of satisfaction to myself to find that, according to the carefully conducted experiments of Mr. Methven, other sources of error, that may be equal in magnitude to those justly ascribable to variations in the consumption of sperm, etc., may occur with apparatus that rigidly complies with the instructions laid down by Parliament and by the Gas Referees. As most of your readers will, no doubt, have an opportunity of perusing the paper in full, I do not propose to attempt anything in the way of a complete abstract of its contents; but will merely remark that Mr. Methven exposes certain defects peculiar to various makes of photometers as at present in use, and points out that the substitution of a 60-inch bar for the 100-inch bar is not likely to secure increased accuracy, because it diminishes the space covered by a single candle, say the difference between 16 and 17 candles. In order to secure a greater range in this respect, he has designed a photometer in which the disc of candles are fixed, and the light being tested is movable. He passes on to deal with various anomalies inherent to the standard burner, showing how a slight variation in the rate of consumption affects the result, also the influence of temperature, atmosperic pressure, degree of humidity in the air, etc. The candle flame is next examined, with equal attention to details. The form of apparatus that Mr. Methven considers most suitable for the securing of accurate results, consists of a standard burner in which the flame is maintained at a regular height of three inches, supplied with a known quantity of dry air, at a regular temperature. In place of the candles a Methven screen is used as the unit of comparison, and the air supply to this apparatus is controlled in a similar manner. Mr. Methven also exhibited an improved form of jet photometer.

A CERTIFICATE incorporating the Kings County (N. Y.) Gas and Illuminating Company has been filed with the Secretary of State. The objects as stated are: "To manufacture, use, supply and sell gas and electricity, or either of them as a means of lighting streets, avenues, roads, public parks and places, and public and private dwellings of the city of Brooklyn, and various towns and villages in the county of Kings." The capital stock is $100,000, with power to increase. The incorporators are: Messrs. Chas. C. Burnes, of New York; J. R. O. Sherwood, of Glen Cove, and A. H. N. Ehre, of Hollis, L. I.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

ACCORDING to a recent decision from the United States Circuit Court, for the Northern District of the State of Illinois, it is formulated that when the action of a city in executing public improvements is within the scope of its authority, it will not be enjoined at the suit of one who is subjected to loss and damage by the method of doing the work which is adopted by the city. The title of the case is "Union Steamboat Company *vs.* Chicago."

SOME time ago the authorities of Clinton, Iowa, entered into a contract for the public lighting of the city (the exact date of the contract was March 15, 1886) for a period of 10 years, with the Thomson-Houston Electric Company, of Boston, Mass. Under the terms of the agreement the contractors were given the exclusive right to furnish electric currents for public and commercial purposes for a period of 10 years, a modifying clause being to the effect that at the end of the specified 10 years the city might purchase the plant for operation on municipal account. If the authorities did not avail themselves of this privilege, then the Company was to be given a further 10 year extension of its exclusive possession. The work of installation was proceeded with, and in due time the lighting was furnished as per contract. Early in November of this year, owing to certain arrogant methods pursued by the electricians, an agitation was instituted which had for its object the overthrow of the contract, the agitators claiming that the agreement was in contravention of public policy and had not been made in accordance with the forms of law prescribed. A resolution was, on November 19, adopted by Council, asking the City Solicitor to pass an opinion upon the contract, and that official, in a communication to the Council dated December 10th, gave it as his judgment "that the ordinance and contracts preclude the exercise of the legislative powers of the city;" and (2d) that the contract was entered into without compliance with chapter 13 of the revised ordinances of the city, which provides that public improvements of any kind, the estimated cost of which shall exceed $100, shall be let to the lowest responsible bidder after proper advertisement for bids. Council, on reception of this opinion, then unanimously adopted a resolution declaring the contracts of March 15, 1886, and all measures supplemental thereof, to be invalid, that the same were accordingly rescinded, and that from and after the 10th day of January the city would cease to pay for all electric lighting furnished under the old agreement. Immediately after the passage of this resolution City Auditor Sutton was instructed to call for sealed bids for lighting the city, bidders to specify the sort of light (together with the actual and nominal candle power of the same) they proposed to furnish. The competition is to close on January 4, and it is not altogether unlikely that the Clinton Gas Company will figure as a contestant for the contract. In the meantime it is safe to say that the present contractors will institute legal proceedings against the city, although it must be confessed that, from the opinion of the City Solicitor, their chance of securing a judgment in their favor seems very remote.

MR. NELSON HOYT has resigned his position as Superintendent of the works of the Easton (Pa.) Gas Company.

AT a meeting of the Directors of the Easton Gas Company, held on the afternoon of the 19th inst., Mr. Wm. H. Ward was elected Superintendent vice Mr. Hoyt, resigned. The new Superintendent has been connected with the Company for the past nine years, and is a competent, trustworthy gentleman. That he is well liked by his neighbors is shown in the fact that one time he represented in the City Council the ward (the third ward) in which he lived.

AT a meeting of the City Councils of Philadelphia, held on the 19th inst., both branches consented to a resolution (presented by Mr. C. U. Smith) requesting the joint special committee of the two chambers, appointed to consider the advisability of establishing an electric light plant for the city, to report on the 2d prox., giving a detailed statement of the cost of the construction of such a plant, and the cost of maintenance. Among other things spoken by Mr. Smith in support of the resolution, he claimed that a plant equal to the maintenance of 1,200 arc lamps of 2,000-candle power each could be constructed at a cost of $300,000, and that it could be maintained for $90,000 per annum. He estimated that this plant installation would do away with about 3,000 gas lamps. If our information about the Smith presentation of the case is correct, we fail to see wherein lies the economy to Philadelphia of an installation of the sort proposed on the basis of cost suggested.

THE illumination of the Hotel Lafayette, Philadelphia, by means of Lungren burners, is simply superb.

ASSOCIATE JUSTICE POCHE, of the Louisiana Supreme Court, has handed down the following decision in the case entitled "No. 10,280, New Orleans Gas Light Company *vs.* City of New Orleans *et al.*" The Judge says: "Plaintiff brings this suit in the capacity as a taxpayer for the purpose of setting aside a contract made between the city and the Louisiana Electric Light and Power Company, in May, 1887, to light the city with electricity for 5 years, beginning on the 1st of January, 1888. The grounds of attack, to be considered on appeal, are the following:

"*First.*—That the contract is null and void, because it violates the prohibition contained in section 2,448 of the Revised Statutes, which provides that: 'The police juries of the several parishes, and the consolidated authorities of incorporated towns and cities in this State, shall not hereafter have power to contract any debt or pecuniary liability without fully providing in the ordinance creating the debt the means of paying the principal and interest of the debt as contracted.'

"*Second.*—That the city of New Orleans had no power in law to enter into such a contract.

"The defense is practically a general denial, and the judgment on appeal rejected plaintiff's demand. A statement of the principal features of the contract is necessary to a proper understanding of the grounds of attack. After the adopting of an ordinance on the subject, and after public advertisement calling for sealed proposals to light certain portions of the city, therein designated, with electricity, for a term of 5 years, and the lowest bid having been made by the Louisiana Electric Light and Power Company, the contract was executed between the city and that corporation, containing numerous stipulations not necessary to enumerate in this opinion. After fixing the rates to be paid for such light to be established and operated under the contract, the following stipulation was agreed on: 'And the said city of New Orleans hereby binds and obligates itself to make and set apart in its budget of expenses for each year a special appropriation sufficient in amount to cover the provisions of the contract, and to set the same aside and to dedicate the same to the purposes aforesaid.'" Judgment affirmed.

"*Syllabus.*—1. A time contract between municipal corporations and a gas or other lighting company for a supply of gas or other light for several years, does not evidence the contracting of a debt within the scope and meaning of section 2,448 of the Revised Statutes, if it appears that the gas or light to be furnished in the future is to be paid for from month to month.

"2. A stipulation in the contract by which the city binds itself to make an annual appropriation out of her current revenues in an amount sufficient to cover the provisions of the contract, is sufficient provision to meet the pecuniary liability to be thereby incurred within the requirements of said section 2,448 of the Revised Statutes.

"3. In the absence of a special statutory limitation or restriction, the power given to the city of New Orleans to make contracts for lighting its streets, landings, etc , is sufficient to authorize a contract for more than one year for such commodity.

"Judgment is therefore affirmed."

AT a meeting of the stockholders of the Las Vegas (New Mexico) Gas and Coke Company, held about a fortnight ago, it was decided to install an electric light plant, work on which is to be begun at once. This we presume is in compliance with the franchise for such operation recently granted the Company by the authorities. Under this franchise the Company can supply electric light for a term of 50 years, provided the plant is installed within one year from the passage of the enabling act. The proprietors make little doubt that they can more than divide the business of supplying electric light in the city with the Company (the Electric Light and Milling Company) that is now *attempting* to perform this task.

To complete our reference to Los Vegas, we might note that the idea of supplying electricity there is not to be carried out at the expense of interfering with the matter of the extension of the gas supply. That this is so seems amply borne out by the fact that a reduction in gas rates was recently announced, the new schedule calling for the payment of $2 per 1,000 cubic feet, while those who use 5,000 cubic feet or more in 30 days are entitled to a rebate of 10 per cent. from the gross figure. This is cheap gas, and is not only an earnest of the liberal policy of the Company, but is also a sterling tribute to the capability of Mr. M. S. Hart, Supt. and Secretary of the Company, as a business manager and a go-ahead gas maker.

AT a special town meeting, Peabody, Mass., it was decided to appoint a committee to investigate the subject of lighting the town by electricity, and the Selectmen were further instructed not to grant a franchise to any company until after the report of this special committee was made at the annual town meeting, to be held in March, 1890.

GEO. A. SHELEY, said to be a resident of Detroit, Mich., has applied to the Common Council, of Port Huron, Mich, for a franchise to manufacture and sell gas in that city. He agrees not to charge in excess of 35 cents per 1000 cubic feet for fuel gas, and is desirous of securing a concession that shall run for 30 years. The plant is to be in operation by January 1, 1891. If the Port Huron Council is wise it will sift Mr. Sheley's promises through a very close mesh, and will end by refusing to grant him the privilege.

THE sales-offices of the Parker-Russell Mining and Manufacturing Company have been removed to the Mermod-Jaccard Building, Broadway and Locust streets, St. Louis, Mo. It will be noted that this is not a very great change, as their rooms in the American Central Building were located "just over the way" on the same street intersections.

MR. CHARLES E. DAVENPORT, Secretary of the Troy (N. Y.), Gas Company, is our authority for the statement that no site has yet been decided upon for the manufacturing plant of the consolidated companies. Further, it is not likely that the choice will be made before next spring.

THE proprietors of the Fairfield (Iowa) Gas Company have decided to install a Brush electric plant. The building for its housing is well under way, and the company expects to supply customers with arc light some time next month.

AT a meeting of the Light Committee, of Cincinnati, Ohio, the following bids for lighting the city by means of arc lamps were opened: The Cincinnati Electric Light and Power Company (represented by Abner Smith, Jr.), bid $63.25 per lamp per year. The Cincinnati Electric Light Company (represented by General Hickenlooper) offered to do the work of for $73.89½ per lamp, while the Brush Company would take $59.98 per lamp. No action was taken.

WE understand that the contract for lighting the streets of Rockland, Me., for a term of 5 years, recently awarded the Eastern Electric Company, of New York, has been transferred to the Eastern Electric Construction Company, of Portland, Me., which is said to have purchased a controlling interest in the local gas and electric companies. The plant will be installed on the gas works plot, and the supply of electricity for all purposes will also be carried on in the adjoining district of Thomaston. Mr. F. A. Sawyer will be Treasurer and Manager of the consolidated enterprise.

THE Common Council of Buffalo, N. Y., has finally awarded contracts for the public lighting to the gas and electric companies at the prices named in their bids published in the JOURNAL some weeks ago.

ACCORDING to a special despatch from the Associated Press, dated a fortnight ago, from Portsmouth, N. H., we learn the following: "The United Gas Improvement Company, of Philadelphia, last month filed in the office of the clerk of United States Circuit Court for the district of New Hampshire, a bill in equity against the Peoples Gas Company, of Manchester, which operates under lease the plant of the Manchester Gas Light Company. The Philadelphia Company owns the letters patent granted to T. S, C. Lowe, in September, 1875, for improvement in the process and apparatus for the manufacture of illuminating or heating gas, and in a suit against the New Haven Gas Light Company, decided in Circuit Court by Judge Wallace last September, these letters patent were held to be good and valid in law. The Company complained that the Peoples Company was infringing upon the letters patent, and asked that the latter Company be restrained and enjoined provisionally and perpetually from making gas which the experts testify is made with the same apparatus as was used at the New Haven works. Mr. J. B. Varick, President of the Peoples Gas Company, made an affidavit that the Manchester Gas Light Company's plant was one adapted only for the manufacture of gas, and denied that the water gas made and supplied to the city of Manchester was made by the apparatus described in the affidavit of F. H. Shelton, a gas engineer of Philadelphia, and was not an infringement upon the process claimed in the patent. That it was only manufactured at intervals and in small quantities for the purpose of supplementing the supply of coal gas when such supply was inadequate for the needs of the Company's customers. Upon a hearing of the motion for injunction, Judge Colt granted the same, and it was ordered that injunction issue restraining the Peoples Company from any further violation or infringement of the letters patent of Lowe, and from all use

in any manner of the apparatus and process of manufacturing illuminating water gas carried on in connection therewith and described in the affidavit of Shelton."

THE Hutchinson (Kas.) Gas Light and Fuel Company's new plant is receiving the finishing touches, and if nothing untoward happens gas will be turned into the mains on New Year's day.

HIS many friends will hear with pleasure that Mr. Jacob Zabriskie, well known in connection with St. Louis gas affairs, is recovering from the paralytic stroke that attacked him some years ago. His physicians assert that the cure will be radical and permanent.

THE extension of the Lawrence (Mass.) Gas Company's mains to North Andover is about completed.

THE new electric plant of the Wilmington (N. C.) Gas and Electric Light Company is ready for work. Some of the apparatus is as follows: Two 100-horse power boilers; four 25-light arc dynamos; one incandescent dynamo capable of maintaining 650 lights of 16-candle power each.

ABOUT a fortnight ago Mr. Justice Tait, of Montreal, Canada, heard the case of Wm. Haddlesay against the Montreal Gas Company, in which complainant asked for $300 damages for sickness in his family caused by an escape of gas into his dwelling from the street mains of the Company. He claims that the defect was brought to the notice of the Gas Company, and as the latter took no immediate steps to remedy the trouble the Board of Health was appealed to. The Board's inspector located the source of the escape, after which the Gas Company remedied the evil. In defending the suit the Gas Company claimed that the leak was not the result of its negligence, hence it was not liable. Decision was reserved.

THE Long Branch (N. J.) Electric Light Company, which is virtually a branch of the local Gas Company, is completing the erection of a generating station on the plot at the rear of the gas works.

AT a recent meeting of City Councils, Reading, Pa., a contract for lighting the streets was awarded to the Reading Electric Light and Power Company, on the basis of $120 per annum for each 2,000-candle power arc supplied, the payment for incandescent lamps (48-candle) to be at the rate of $22 each per annum. The contract calls for all-night lighting.

AT a meeting of the Council of the Newport (R. I.) Sanitary Protective Association, held on the 19th inst., Prof. Wolcott Gibbs, of Harvard University, spoke at length on the "Dangers of Water Gas as a Means of Illumination." The Professor's remarks did not contain anything particularly new or novel on the matter in hand, but his dissertation eventually led to the appointment of the President of the Association as a Committee to communicate with the President of the Newport Gas Company for the purpose of ascertaining the precise percentage of water gas which it was proposed to use in the gas that was in future to be supplied to the city; and that then "the general subject of the use of water gas in the State should be brought before the medical profession, the local board of health and the State board of health, in order that the community at large may be protected from all avoidable danger." It was also decided that the Association should employ an expert to analyze the gas at present supplied to the city, as well as samples taken from time to time after the introduction of water gas by the Newport Gas Company, for the purpose of ascertaining the relative percentage of the two ingredient gases.

MR. M. P. GREY has been elected President of the Salem (N. J.) Gas Company. The Company has also granted a concession in gas rates, to take effect from the 1st inst., after which date the net figure is to be $2 per 1,000 cubic feet. It is likely that plant extensions will be made at this point next season.

MR. TABER still continues to "boom" the electric lighting division of the New Bedford (Mass.) Gas Company's business. A recent addition to the electric annex is in the shape of two 50-light arc dynamos.

THE annual election of the Columbia (Pa.) Gas Company resulted in the following choices: President, J. A. Myers; Directors, H. M. North, H. F. Bruner, C. E. Graybill, J. A. Myers, M. S. Shuman, Jos. H. Black and W. B. Given.

THE Titusville (Pa.) Gas Company has taken possession of its new business quarters in the old post office building. The Company's send-out is rapidly increasing.

MR. THOMAS E. CRIMMINS is putting down an 8-inch feeding pipe to replace the present 6-inch main that connects the distributing systems of the Union Gas Light Company (East New York district of Brooklyn) and the Fulton Municipal Company. One might be forgiven for saying that it would be in line with economy were a 12-inch main put down instead of one of the diameter to be actually employed.

IT is said that the Charleston (S. C.) Electric Light Company is agreeing to light small dwelling-houses in that city (houses having 6 rooms) at a charge per month of from $2 to $3. The nominal candle power of the lamps employed is rated at 16. In the meantime it is rumored that the Gas Company is seriously considering the advisability of installing an electric lighting plant.

THE Brookline (Mass.) Gas Company has declared a dividend of 3½ per cent.

THE stockholders of the Consumers Gas Company, of Jersey City, N. J., have elected the following Board of Directors: Charles Place, W. W. Gibbs, H. C. Gibson, Felix Campbell, A. C. Humphreys, W. Clark, R. Morgan, S. D. Bodine, E. C. Lee, Joseph O'Brien, E. Wells Sackett, Albro Howell and R. W. Elliott.

ON January 18, 1887, a youth named Anderson (then resident in the village of Hyde Park, which now forms a portion of Chicago), was induced by a lamplighter in the employ of the Illinois Street Gas Lamp Company (the latter was furnishing to the village public lighting by means of gasoline lamps) to assist him in the task of lighting the lamps. One of these was in a leaky condition, and when the youth applied the torch to the burner the reservoir exploded, causing severe injuries to his person. His guardian brought suit against the village and the contractors, assessing the damages at $25,000. The case was put on the calendar, but a compromise has since been agreed to under which plaintiff is to receive $3,000, each of the impleaded parties contributing the sum of $1,500.

A DESPATCH from Asheville, S. C., dated December 21, says: "Soon after daybreak, this morning, a gasometer owned by the City Gas Works exploded with fatal effect. Last night, owing to some defect in the works, the gas was cut off, and men were engaged all through the night making repairs. The water was drawn from the tank that a man might get inside to stop the leak. While so doing with a lantern the gas was ignited and the explosion followed, instantly killing William Gates and Lewis Guthrie and slightly wounding two others. The bodies of the men killed were thrown some distance and badly mutilated. The gasometer was totally destroyed and other parts of the works badly injured. The explosion was heard all over the city. The fire alarm was sounded and the fire companies were quickly on the spot. Steps were at once taken to repair damages, but it will be some days before the supply of gas will be renewed."

MR. R. E. SLADE, who had charge at Asheville for a portion of the year, has been in charge of the works of the White Plains (N. Y.) Gas Light Company since October last. This company also operates an electric lighting plant, and both departments of its business are going along very smoothly.

THE authorities at Minneapolis (Minn.) have determined that hereafter no electric light wires shall be strung in that city except those placed under the direction of the City Engineer. It has also been decided to erect 204 new gas lamps in the outlying sections of the city.

AT an adjourned hearing of the case of the Chelsea (Mass.) Gas Company vs. the American Fuel Company, held about a fortnight ago before the Massachusetts Board of Gas and Electric Light Commissioners, President Roberts, of the Fuel Company, stated that on account of certain delays in placing their machinery they had not been able to make a satisfactory trial run, and in consequence were not able to present the analyses of the gas asked for at a prior hearing of the Commission. The process, however, was virtually ready for inspection at the Fryer factory works. The Commissioners decided not to inspect the works and process at this time, but, with the consent of all parties interested, left it to the Fuel Company to say when the trial run should be made. This will probably be made early in January, and the understanding is that the old Chelsea Company shall have an expert on the ground when the test is being conducted.

DURING the past year 205 new consumers (a net gain) have been added to the rolls on the Brookline (Mass.) Gas Company's ledgers. The increase in sendout for the year amounted to about 9.5 per cent.

THE Board of Directors of the Mutual Gas Company, of Southbridge, Mass., now numbers 7 instead of 5 members. The list is: H. C. Wells, Andrew Hall. C. A. Dresser, C. D. Paige, F. L. Chapin, G. W. Wells and H. C. Cady.

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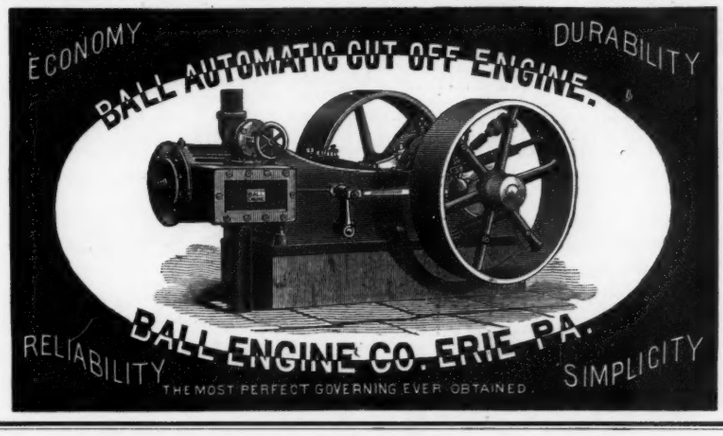

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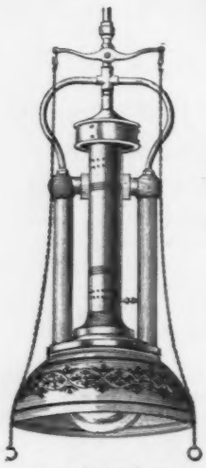

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AND
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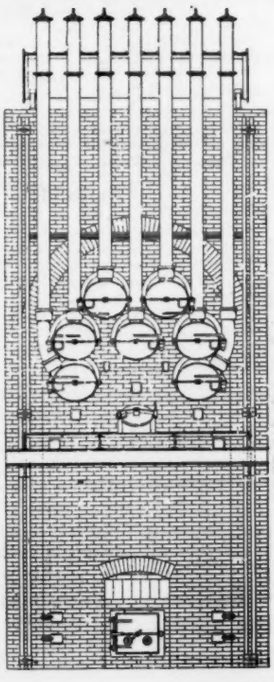

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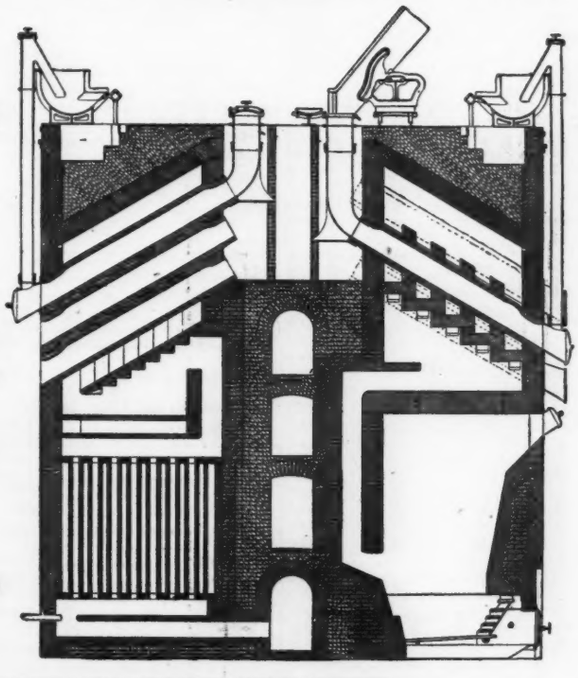
It will Save from 50 to 60 per ct. in Labor.



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Erected and in course of construction at present date:

	Capacity. Cubic feet per day.
Altrincham	600,000
Adelaide	600,000
Aldershot	200,000
Allegheny, U. S. A.	1,000,000
Ashton-under-Lyne	1,250,000
Amsterdam	1,500,000
"	1,500,000
Annaberg	200,000
Arcachon	100,000
Animal Charcoal Co	200,000
Altoona, U.S.A.	350,000
Buxton	250,000
Bradford	1,000,000
"	1,250,000
"	1,250,000
"	1,250,000
"	1,000,000
"	1,000,000
"	3,000,000
Bremen	150,000
Baltimore, U.S.A.	1,000,000
"	1,000,000
"	1,000,000
Balmain, N.S.W	125,000
Bishops Stortford	150,000
Blackpool	400,000
Brussels	1,250,000
"	1,250,000
"	750,000
"	1,250,000
Banbury	250,000
Birmingham	5,000,000
Birkenhead	2,500,000
Blackburn	1,500,000
Bochum	600,000
Burntisland	250,000
Boston, U.S.A.	2,000,000
Brisbane	1,500,000
"	300,000
Burton-on-Trent	1,500,000
Barcelona	350,000
Barking	100,000
Baerlien & Co	20,000
"	20,000
Bombay	400,000
Buffalo, U.S.A., Mutual	750,000
" **Citizen**	500,000
Brookline, U.S.A.	500,000
Bergen	350,000
Berlin	1,250,000
Bournemouth	1,000,000
Bridgeport, U.S.A.	500,000
Brunswick	300,000
Beck & Co., St. Louis	100,000
Barmen Rittershausen	600,000
Bexhill	125,000
Brooklyn, U.S.A.	1,000,000
"	1,000,000
" **Nassau**	1,000,000
Brunner, Mond & Co.	400,000
Cheltenham	2,000,000
Cannes	200,000
Croydon	1,500,000
Copenhagen	200,000
Clevedon	200,000
Columbus, U.S.A.	500,000
Cincinnati, "	1,500,000
" "	1,500,000
Chicago "	3,000,000
" "	1,000,000
" "	1,000,000
Chemnitz	1,000,000
Crewe	1,250,000
Colonial Gas Works Co	100,000
Cadiz	300,000
Charlottenburg	600,000
Dudley	750,000
Driffield	100,000
Dukenfield	500,000
Dover	750,000
"	1,000,000
Deal	200,000
Derby	1,500,000

	Capacity. Cubic feet per day.
Dublin	3,000,000
Dowlais	100,000
Douai	500,000
Denton	500,000
Derby, U.S.A.	350,000
Denver, "	500,000
" "	1,000,000
Dusseldorf	750,000
"	500,000
Dumfries	250,000
Dunedin, N.Z	400,000
Darlington	1,250,000
Detroit, U.S.A	750,000
Edinburgh	1,500,000
"	2,000,000
Enfield	300,000
Essen	300,000
Elbing	150,000
Falmouth	150,000
Frankfort	300,000
Farnworth	400,000
Fenton	400,000
Friedenshutte	500,000
Furth	400,000
Freiburg	200,000
Goole	250,000
Glossop	300,000
Guildford	300,000
Gloucester	1,250,000
Gera	300,000
Grafton, N.S.W	100,000
Grieg	300,000
Georgetown, U.S.A.	250,000
Gluckauf	200,000
Heywood	600,000
Holywood	125,000
Huy	70,000
Harrow	250,000
Harrogate	250,000
Halstead	150,000
Heilbronn	200,000
Havana, Cuba	750,000
Hastings	1,500,000
Huddersfield	300,000
"	750,000
"	1,500,000
Hof	200,000
Hampton Wick	500,000
Heckmondwicke	500,000
Haverfordwest	100,000
Halifax, N.S.	350,000
Hamm	200,000
Halle	400,000
Heidelberg	300,000
Hartford, U.S.A.	1,000,000
Ilkeston	300,000
Inverness	250,000
Ilkley	200,000
Ilford	100,000
Kingston-on-Hull	400,000
Kidderminster	750,000
Kidsgrove	100,000
Konigberg	1,000,000
King's Lynn	300,000

LONDON:—

The Gaslight and Coke Co.:

Beckton	1,250,000
"	1,250,000
"	1,250,000
"	1,250,000
"	1,250,000
"	1,250,000
"	2,500,000
"	2,500,000
Silvertown	1,000,000
Bromley	2,000,000
"	1,500,000
"	1,500,000
"	1,500,000
"	2,000,000
"	1,500,000

LONDON—*Continued.*	Capacity. Cubic feet per day.
Shoreditch	2,500,000
Pancras	1,500,000
"	1,500,000
Pimlico	2,000,000
Nine Elms	3,000,000
"	3,000,000

South Metropolitan Co:—

Greenwich	3,000,000
Woolwich	400,000
Vauxhall	3,000,000
"	3,000,000
Lea Bridge	300,000
West Ham	1,500,000
Leeds	2,000,000
"	3,000,000
"	3,000,000
"	3,000,000
"	3,000,000
"	2,000,000
Leominster	150,000
Leiden	560,000
"	600,000
Liverpool	2,000,000
"	2,000,000
"	2,000,000
"	2,000,000
"	2,000,000
"	3,000,000
Lincoln	1,000,000
"	600,000
Lowell, U. S. A.	1,000,000
Louisville "	1,500,000
Long Eaton	500,000
Lilie	900,000
"	450,000
"	750,000
"	250,000
"	250,000
Luckenwalde	330,000
Liegwitz	300,000
Lincoln, U. S. A.	250,000
Lawrence "	500,000
Lynn "	300,000
Lyons	1,500,000
Maidstone	1,000,000
Marseilles	1,500,000
"	1,500,000
Mons	500,000
Malines	250,000
Melbourne	1,500,000
"	1,500,000
"	1,500,000
"	1,500,000
"	1,500,000
Manchester	2,500,000
Middleton	400,000
Manley, N. S. W.	100,000
Minneapolis, U. S. A.	750,000
Magdeburg	300,000
Memphis, U. S. A.	750,000
Nottingham	1,250,000
"	2,500,000
"	2,500,000
"	2,000,000
"	1,500,000
"	2,000,000
Newport, U.S.A.	430,000
Newmarket	150,000
Newark, U.S.A.	680,000
Northfleet	200,000
New York, U.S.A.	2,000,000
Nice	600,000
Newcastle, N. S. W.	200,000
Numea, "	100,000
Namur	250,000
Newark	350,000
Oldbury	500,000
Otley	200,000
Oswestry	250,000

	Capacity. Cubic feet per day.
Ober Schlesian	1,500,000
Otto & Co.'s Coke Works	1,500,000
Plymouth	2,000,000
Parramatta, N. S. W.	100,000
Prescott	150,000
Providence, U.S.A.	750,000
"	750,000
Plauen	300,000
"	300,000
Portsmouth	2,500,000
"	2,500,000
Pittsburgh, U.S.A.	1,500,000
Portland, "	560,000
Pawtucket, "	500,000
Quebec	250,000
Radcliffe	750,000
Rouen	250,000
Ramsgate	1,000,000
Reigate	200,000
Richmond, U.S.A.	250,000
Roxbury, "	500,000
Runcorn Soap Co.	20,000
Rockhampton, N. S. W.	125,000
Richmond	1,500,000
Reading	2,000,000
Reichenbach	200,000
Salford	1,750,000
"	1,750,000
"	1,750,000
Smethwick	750,000
Sydney, N. S. W.	1,000,000
"	1,000,000
"	2,500,000
"	50,000
"	50,000
Sunderland	1,500,000
St. Josephs, U.S A.	250,000
Spa	100,000
Sevenoaks	300,000
St. Petersburg	2,000,000
"	1,500,000
St. Louis, U.S.A.	2,000,000
"	2,000,000
"	1,000,000
Laclede	1,000,000
Silesian Coal Co.	600,000
San Francisco, U.S.A.	2,000,000
"	2,000,000
Sheepbridge Coal Co.	40,000
Stettin	200,000
Singapore	300,000
Sutton	500,000
Tonbridge	150,000
Tipton	400,000
Tottenham	1,000,000
Toledo, U.S.A.	750,000
Toronto	1,000,000
Uxbridge	300,000
Valparaiso	500,000
West Bromwich	1,000,000
Willenhall	250,000
Weston-super-Mare	500,000
Waltham	150,000
Wormwood Scrubs	300,000
Williamsburg, U.S.A.	600,000
"	600,000
Wellington	150,000
Warwick	300,000
Wheeling, U.S.A.	500,000
Walker	300,000
Westgate	100,000
Wilmington, U.S.A.	500,000
Windsor, N. S. W.	100,000
Wolverton	100,000
Wellington, N. Z.	250,000
Whitchurch	175,000
Washington, U.S.A.	2,000,000
Wallasey	750,000
Weimar	150,000
Wurzen	200,000
Worcester, U.S.A.	750,000
Yeadon	500,000
Yeovil	250,000

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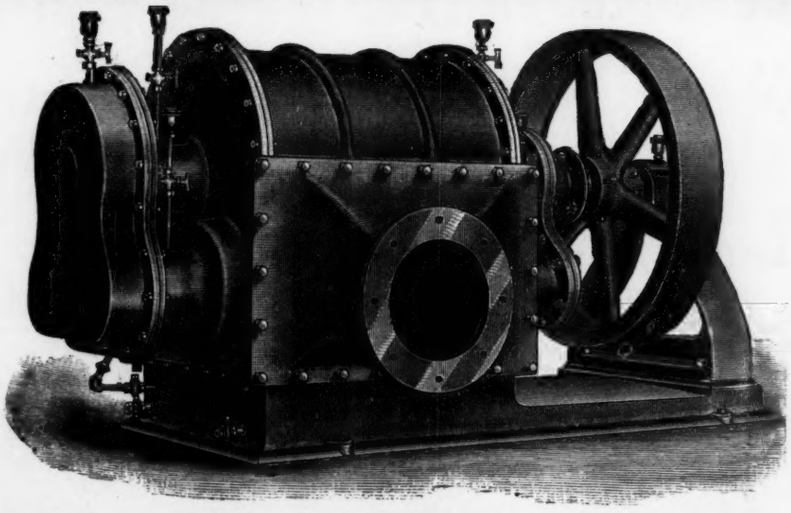

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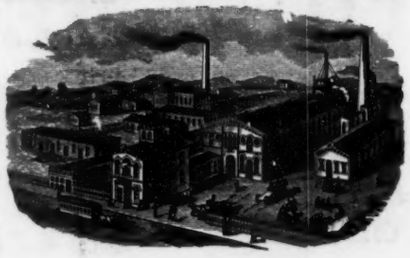

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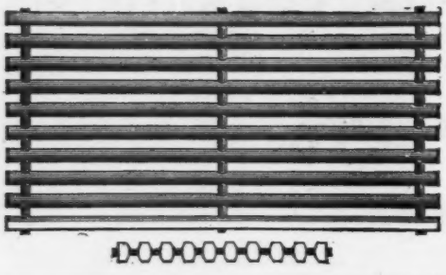

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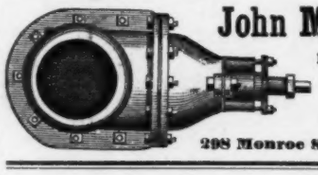

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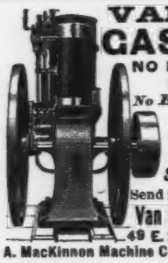

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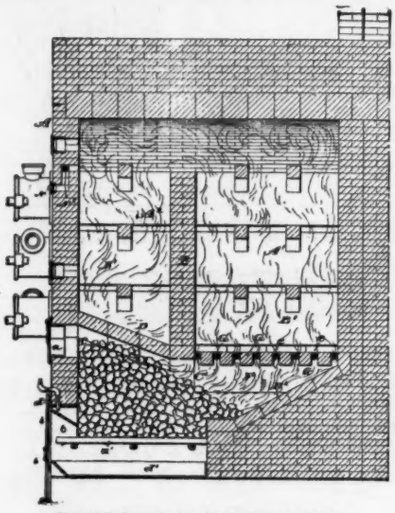

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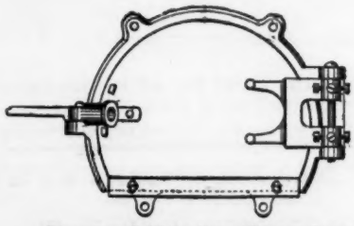

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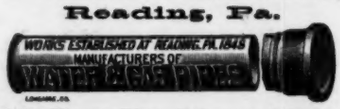

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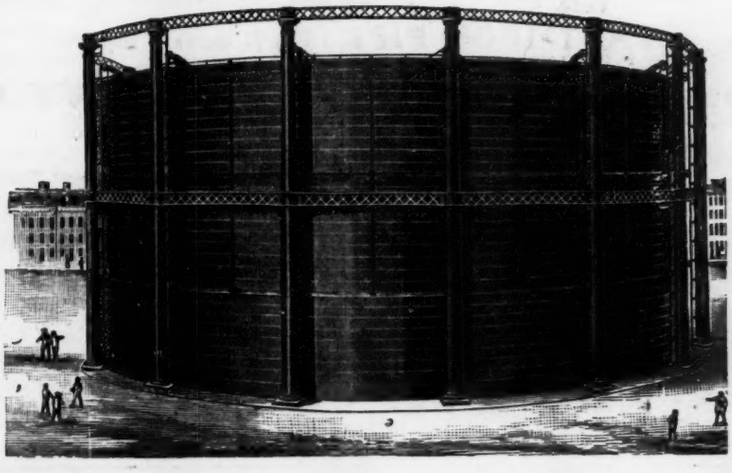

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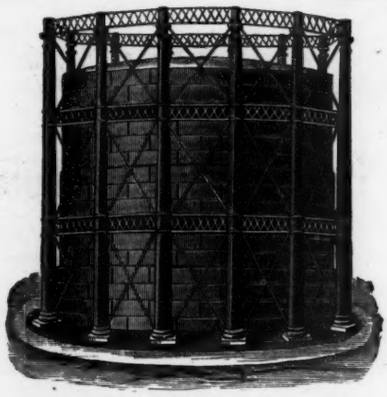

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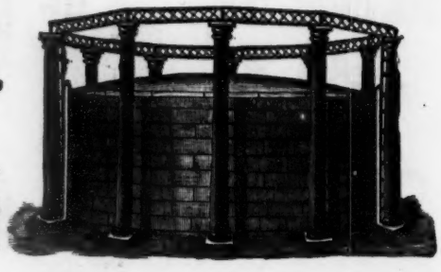

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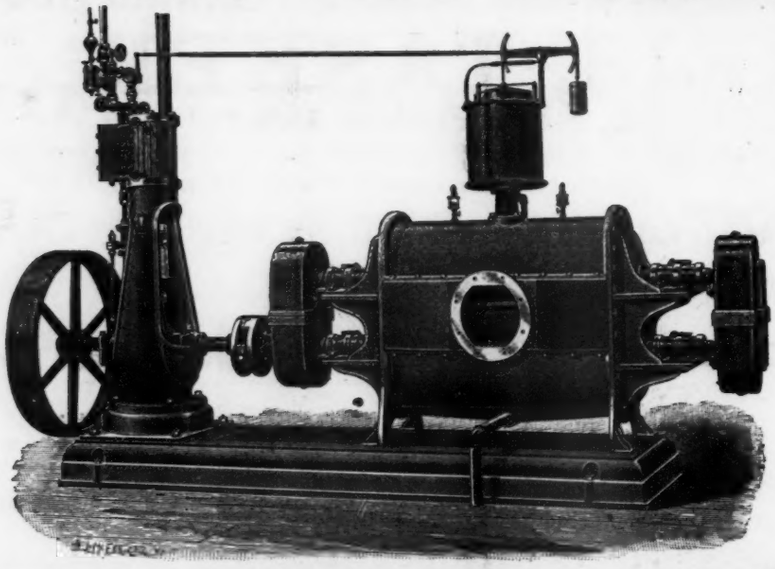

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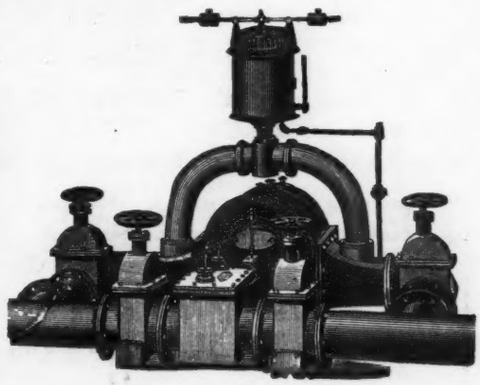

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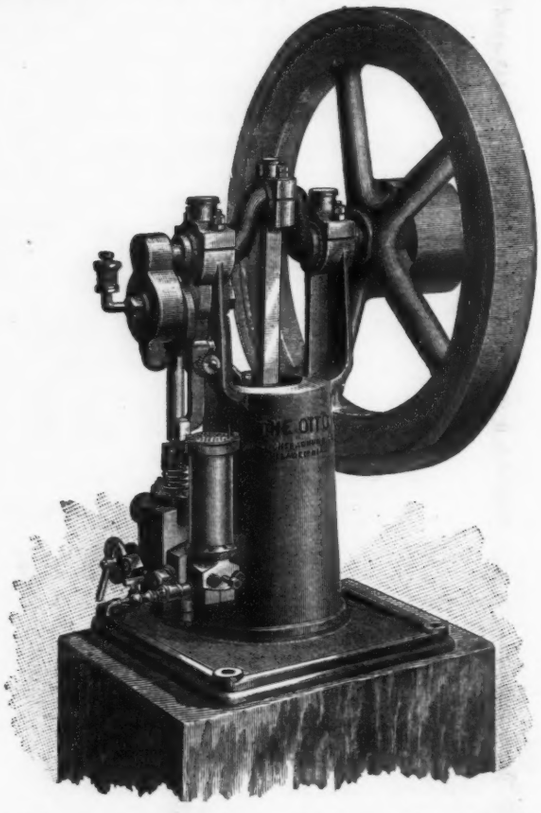

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